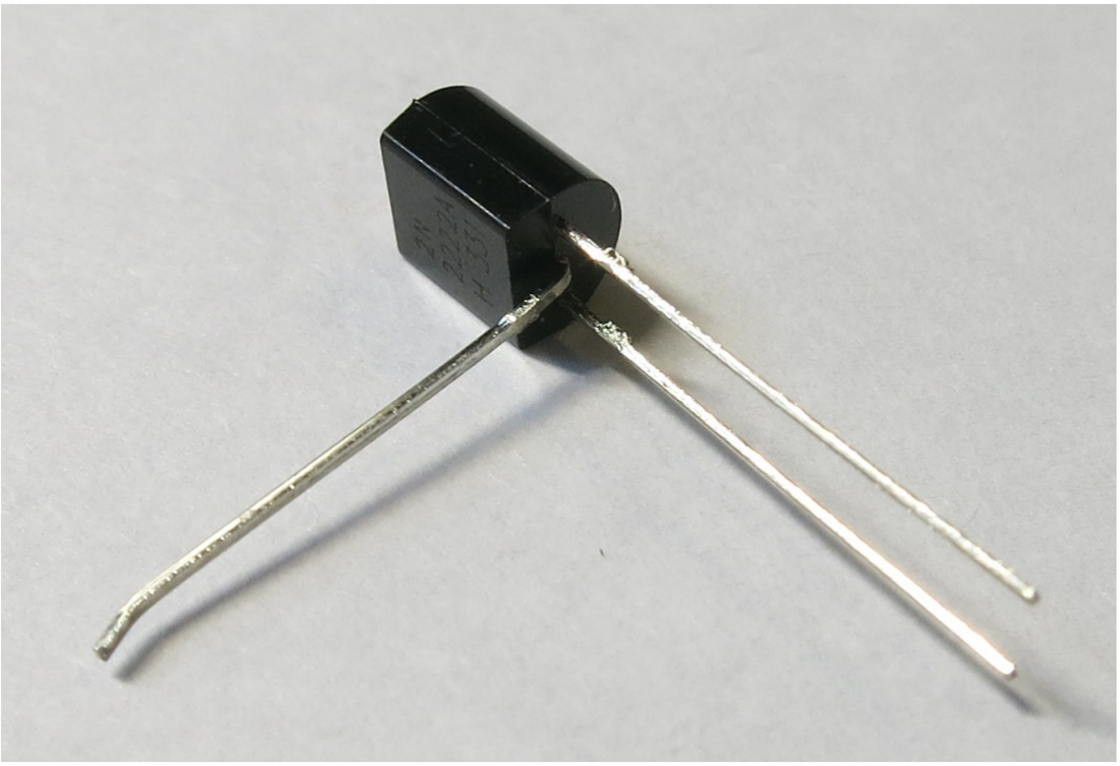
1. Minimize physical size. Since the coil is the largest single piece (other than the AA battery) it makes sense to align the diameter of the coil to the battery and pack everything else as tightly inside as I can.
2. Minimize component count. Most Joule Thief examples on the internet (including the top picture on the Wikipedia page) soldered the legs of the individual components together. No circuit board needed.
3. Friendly to hand soldering. There are some ready-made Joule Thief circuits for sale on the internet using surface mount components and a circuit board. I wanted something I can build by hand and maybe use as a soldering teaching project to be shared on the internet.

After a few iterations, I have something I'm happy to share with the world. This is purely about the mechanical assembly – the electronic schematic is identical to the one in the Wikipedia article linked at the top of this post.

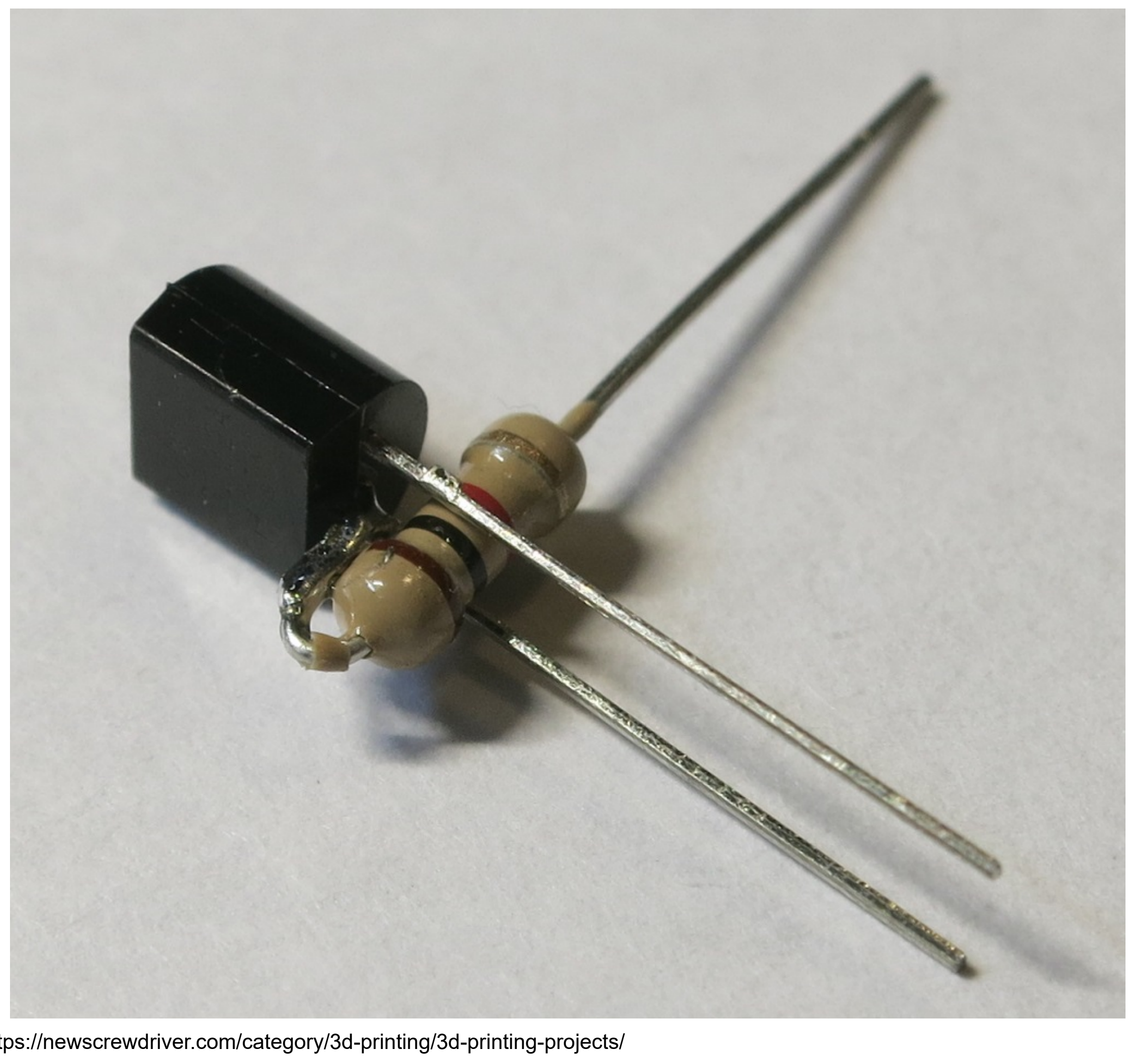
An overview in words:

- The resistor for the NPN transistor base is installed between the collector and emitter. The resistor acts as physical separation in order to avoid a short-circuit.
- The transistor and LED are pointing in opposite directions, allowing their pins to point towards each other and soldered together. The aforementioned resistor keeps the LED anode and cathode separate.
- The transistor is stuffed into the middle of the coil, utilizing the center volume.

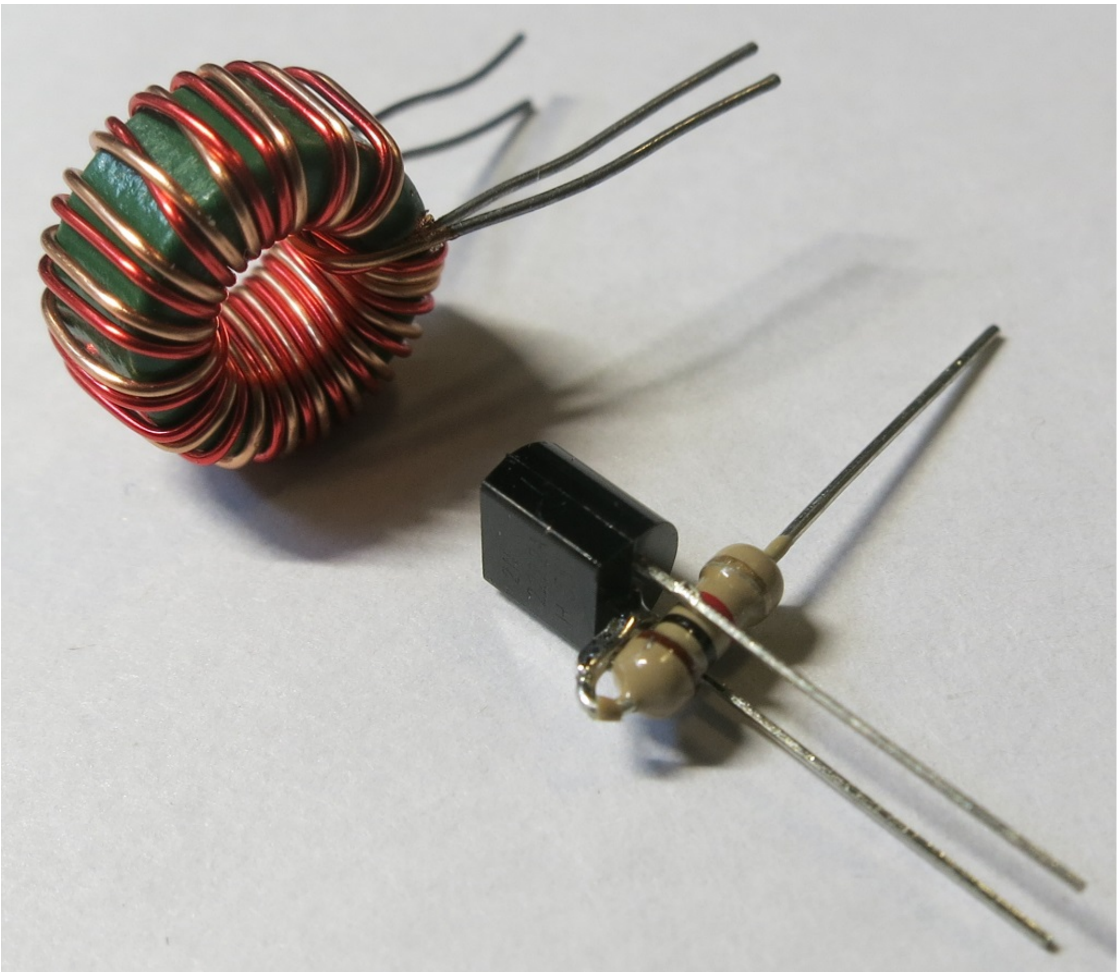
The build sequence in pictures:



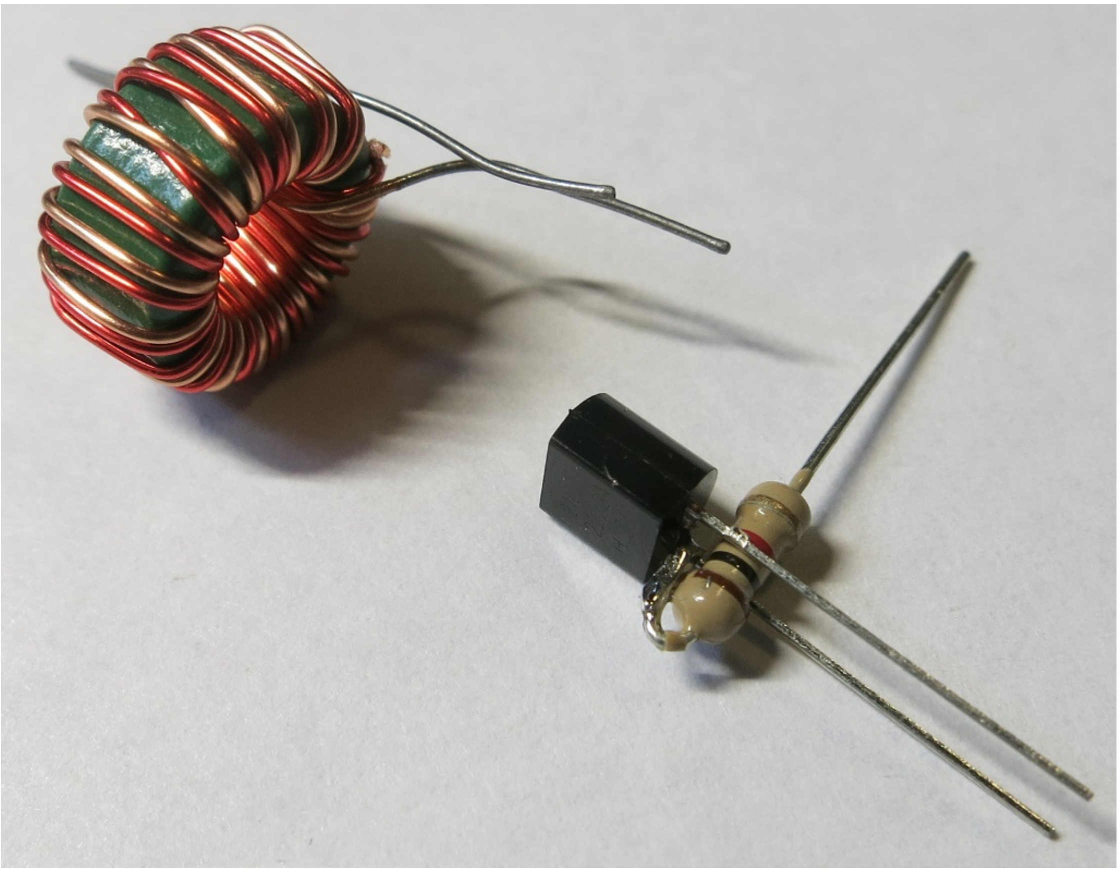
Transistor with the base bent in preparation for resistor installation.



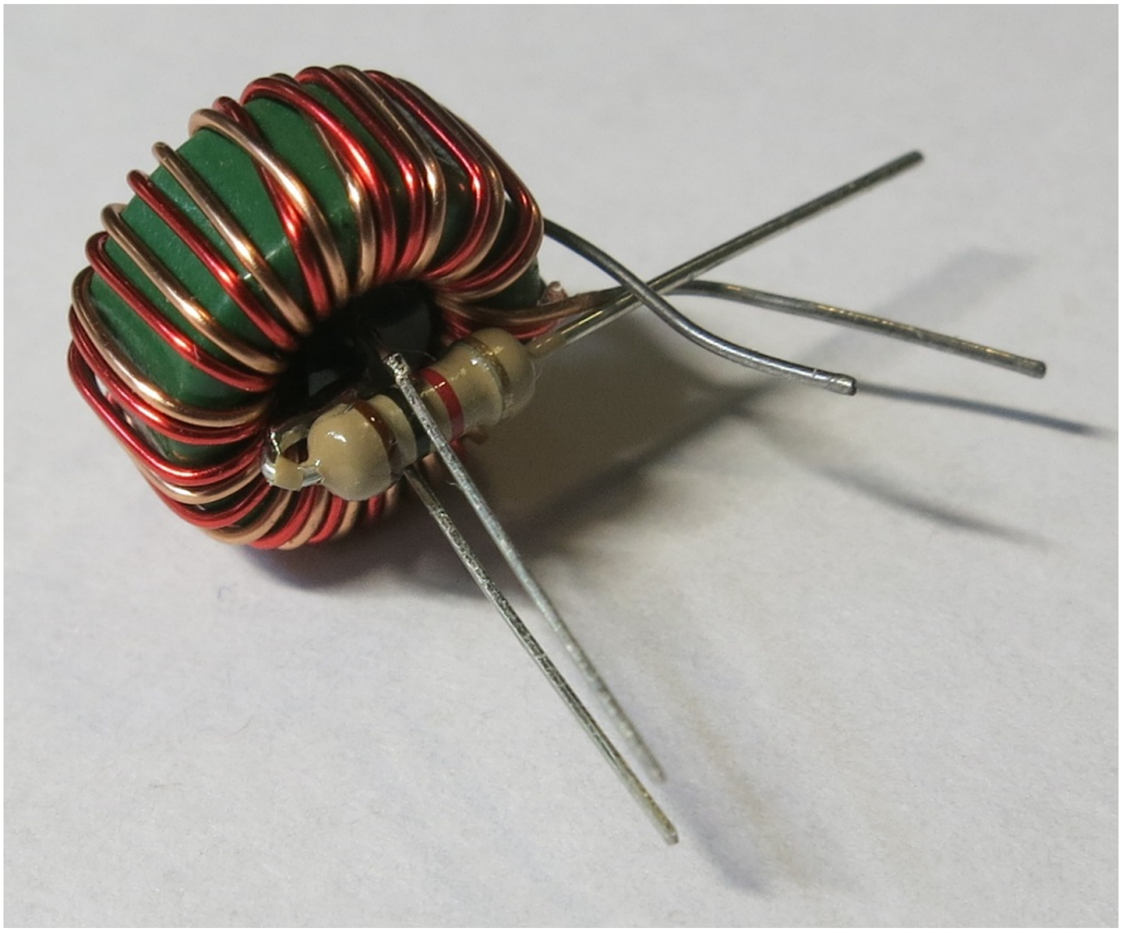
The 1K Ohm resistor is installed on the base, between collector and emitter.



The coil has two wires wound together. One end of this dual-coil is facing the camera, the other end facing away. Since we need to wire up the coil in opposite directions, we'll bend one wire of the front pair towards the back, and the opposite back side wire to the front.

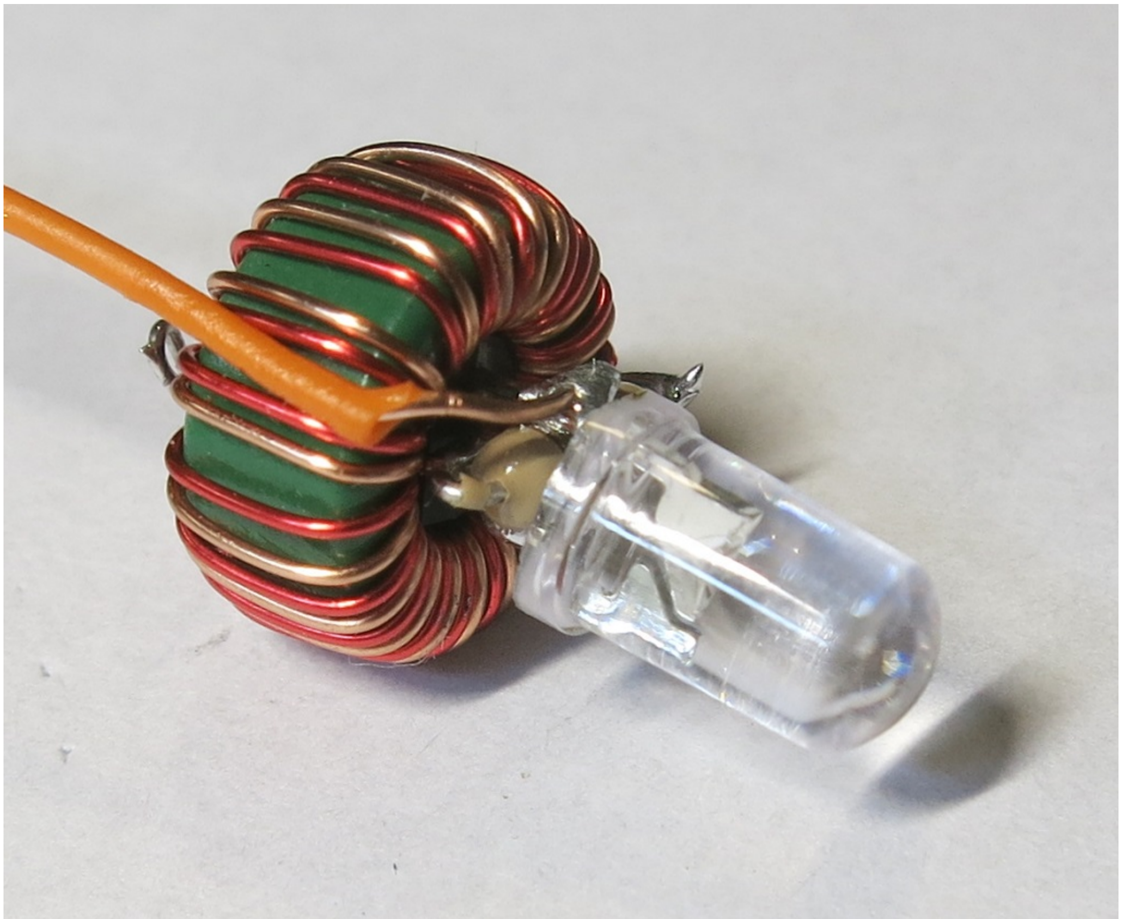


The two wires now facing away from the camera are soldered together to become the positive terminal of the circuit. One of the two wires facing the front will be soldered to the resistor, and the other to the emitter.

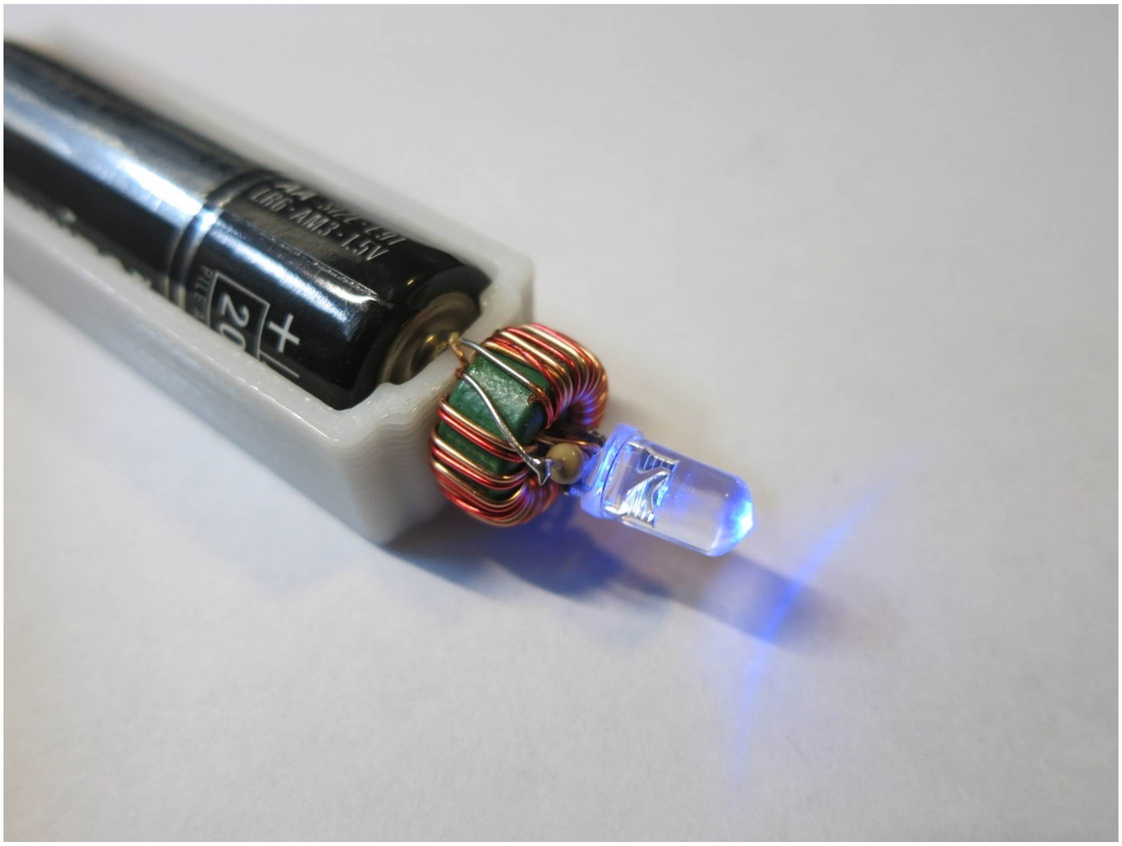


Transistor in the center of the coil. Now the coil wires can be soldered.

Resistor soldered to one coil wire, all the others have been trimmed short in preparation for attaching the LED.



LED is soldered to the circuit, as is a wire to act as negative (return) wire.



Install the whole assembly in front of a 3D-printed AA battery tray: Let there be light!

2017-10-192017-10-19 / **ROGER CHENG**

A 3D-Printed Enclosure to Take My LED Project On The Go

For the **Connect Week (https://connectpasadena.com)** event put on by **Innovate Pasadena (http://www.innovatepasadena.org/)**, the **Hackaday LA (https://www.meetup.com/Hackaday-Los-Angeles/)** group is hosting the "**Bring-A-Hack (https://www.meetup.com/Hackaday-Los-Angeles/events/243694093/)**" event where attendees are encouraged to bring projects (in any stage of completion) for show and discussion. Since I've been building my LTC-4627JR driver board as a learning project, I wanted to bring it in for show-and-tell.

Now I could just bring the assembled circuit board and pass it around as an inert object, but what fun would that be? I wanted to bring in something that shows it doing something, and provide some way for people to interact with the whole contraption. Looking at my parts on hand, it seemed easiest to rebuild my thermometer test project. I can have a simple Python program run on the Raspberry Pi, reading temperature from the Tux-Lab Si7021 breakout board, and sending it out to my display. That makes 3 circuit boards, plus they'll need portable power. I will enlist my Amazon purchases: the 3-cell lithium ion battery pack protected by a S-8254A IC, and the MP1584 buck converter to translate the battery pack's power into Raspberry Pi friendly voltage.